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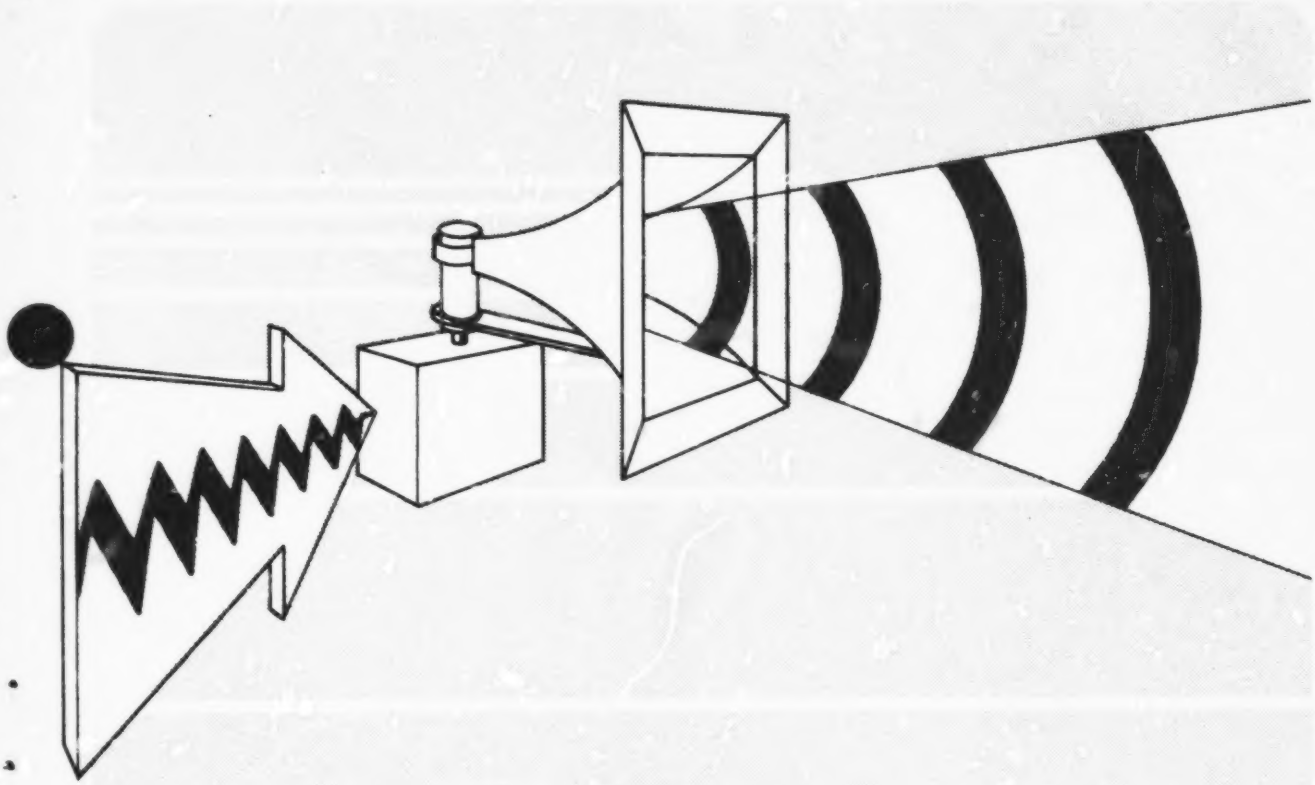
Maintenar ce Manual

Warning Sirens and Their Activation Devices



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MAINTENANCE MANUAL

WARNING SIRENS AND THEIR ACTIVATION DEVICES

Federal Emergency Management Agency

Maintenance Manual
Warning Sirens and
their Activation Devices

Introduction

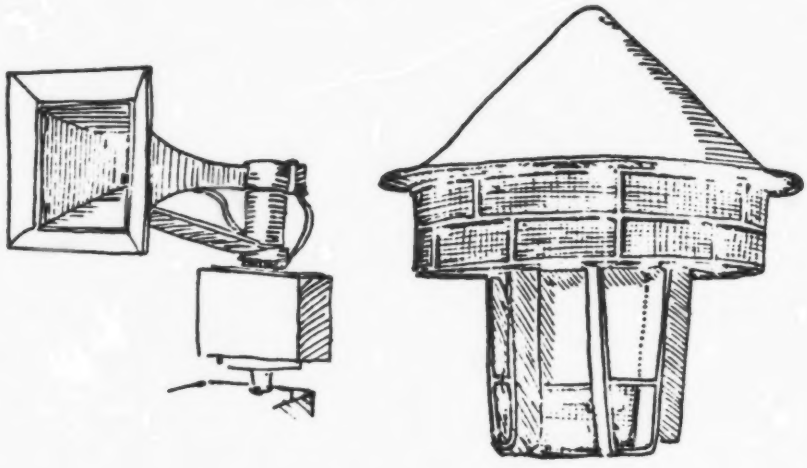
The purpose of this manual is to guide you on how to maintain your warning sirens. The information in this manual is only a **supplement** to the recommended maintenance information supplied in the service manuals provided by the manufacturers of the equipment. **Always follow the maintenance procedures provided in the manufacturer's manuals.** This manual will help you understand why maintenance is necessary. This manual will also be helpful if the manufacturer's maintenance manuals are not immediately available.

Description of Warning Sirens

There are two primary types of warning sirens-- mechanical and electronic. Mechanical sirens produce sound by drawing air, in pulses, through the throat of a horn.

Mechanical sirens appear in two varieties-- rotating and stationary (see figure 1).

FIGURE 1



Rotating and stationary mechanical sirens disperse sound in different ways. In a rotating siren, the horn rotates in a complete circle around the throat, forcing bursts of sound in one direction. A stationary siren sends its warning signal in all directions; it does not have a horn to concentrate sound along a certain path. Stationary sirens require 6 to 8 times the power to produce the same decibel level as directional sirens.
Maintenance problems are more likely in a rotating siren, by virtue of its crucial moving part, the rotating horn.

An electronic siren uses a vibrating metal plate to produce sound. This electrically controlled plate creates sound in the 300 Hz range.

These sirens produce four different types of signals. These signals can be combined in a number of ways. However, **there are 3 standardized signals:**

1) alert-- a sustained dual tone,

2) attack/take cover--a dual tone wailing slowly up and down,

3) fire--a dual tone wail, using a different timing from the attack signal.

A warning siren system may be activated through a direct mechanical connection or through a telephone relay. A number of methods may be used to indicate that the siren system is working. Some include a) a direct mechanical switch, b) a telephone relay, c) radio relay, and d) program times. You may also use some combination of these techniques.

Preventive Maintenance

To ensure that the components of your siren system work in an emergency, you should develop a program where you **regularly check the devices to spot small troubles before they become big problems.** A program of coordinated monthly, semiannual, annual and biennial maintenance checks prevent serious problems from suddenly happening.

Routinely clean all the units. Check for frayed connections and loose bolts and parts; inspect batteries, switches and circuits. These checks are not normally mentioned in manufacturer's manuals, but by not performing them can lead to more serious problems.

Equipment and Spare Parts

Only ordinary mechanical and electrical tools are needed to perform most maintenance on this equipment. In addition, it may be useful to have an AC volt-meter or some sort of voltage indicating device. Some manufacturers provide customized test meters in order to check their activation devices. Consult with your manufacturer's local representative to determine what equipment you will need to maintain your equipment.

Maintain a list of spare parts for each piece of equipment in your system. The following table gives you a list of commonly stocked parts for a mechanical siren.

Spare Parts: Mechanical Warning Siren

Name of part	Quantity
fuses	3
relays	2
brushes for single phase motors	1
overload relay heaters	2
proper oils and greases	see manufacturer's specifications
assorted sized nuts and bolts	

Inspection

Periodically test your sirens. A test is the primary way of ensuring that your equipment will work in an emergency. A test once a month is minimal; adjust according to local conditions.

Safety

ALWAYS wear hearing protection when performing tests or maintenance on a siren. A blast of sound from a siren in close quarters can cause permanent hearing damage.

Disconnect the power source to the siren before attempting any maintenance work. Remember, only a qualified electronics technician should attempt to repair any serious electrical problems.

Sirens are usually placed at some height above the ground, on buildings or towers. **Wear a safety belt or any other device to prevent a fall.**

Follow safety precautions outlined in maintenance manuals supplied by the manufacturer.

12-Month Maintenance Checks for all Types of Sirens

1) Inspect exterior cables and wires for deterioration and damage from water when entering fuse boxes.

2) Examine all wood poles, platforms and braces for wood rot and/or termites. Treat or replace as necessary.

3) Inspect all mechanical and electrical connections for corrosion, rust or water damage.

4) Examine ground rod and connection.

5) Inspect, sand and repaint all exposed metal surfaces which show signs of rust.

6) Check back-up battery power supply (if used).

7) Measure for proper AC voltage.

Maintenance Checks: As Required for Directional Sirens

1) Test siren for one second, using test button.

2) Test receiver/decoder unit with portable tester.

3) Zero all counters. Insure availability of log in cabinet and enter counts.

Monthly Maintenance Checks: Directional Sirens

1) Test siren using auto-test switch.

6-Month Maintenance Checks: Directional Sirens

1) Inspect mountings. Make sure assembly is within 6 degrees of vertical. Correct as necessary.

2) Check cabinets, platforms, brackets and poles for termites and wood rot. Treat or replace as necessary.

3) Inspect all screens for deterioration. Replace as necessary.

4) Examine all relay and fused switch contacts for dirt, corrosion, pitting, etc. Correct as necessary.

6-Month Maintenance Checks: Single Phase Sirens

1) Inspect and examine motor brushes. Replace if less than 7/8 in. or less.

2) Examine motor commutators for burned spots, pitting, or excessive wear. Clean as necessary.

12-Month Maintenance Checks: Directional Sirens

1) Check oil levels. Fill as necessary.

2) Change oils, as necessary.

3) Grease bearings, as necessary.

4) Lubricate valves, as necessary.

5) Inspect and check tension in belts.

6) Inspect and replace all defective screens.

7) Check chain drive for adequate amount of grease. Reapply as necessary.

8) Check belts and rotation drive assemblies. Adjust or replace as necessary.

9) Make sure there is sufficient air space for air intake.

12-Month Maintenance Checks: Electrical Sirens

1) Examine diaphragm for signs of stress or deterioration. Replace as necessary.

2) Examine electronic components for tightness and integrity.

24-Month Maintenance Checks: Directional Sirens

1) Examine collector ring and rotator ring brushes for dirt and wear.

Corrective Maintenance: Troubleshooting

Some equipment malfunctions may be discovered during inspection of the equipment or in the actual use of your warning sirens. Perform the tests on the following table to locate, and possibly correct, the problem.

PLEASE NOTE: This manual does not attempt to list all possible malfunctions that could occur nor can we suggest all possible remedies. Consult the manufacturer's manuals or the manufacturer directly if a malfunction is not listed or it is not corrected by a prescribed procedure.

Table 1

Corrective Maintenance Table: Rotating Sirens (Part 1 of 5)

Malfunction	Possible Cause	Recommendation
1. Horn does not rotate	■ rotator switch in control cabinet in center-off position	■ set rotator switch to test. Observe horn rotation. If horn rotates, set switch to Automatic.
	■ rotator motor starter overload relay tripped	■ reset
	■ open circuit between control cabinet & motor	■ check wiring for continuity
	■ rotator motor starter control winding defective	■ check coil and replace if necessary
	■ rotator motor defective	■ check motor and repair or replace
	■ reducer gear mechanism jammed	■ turn coupling by hand. Locate source of binding if coupling turns hard.
	■ foreign material jamming rotating mechanism	■ clear obstructions with blower. Do not use flame.
	■ defective gear reducer	■ replace
	■ upper or lower bearing seized	■ free up & lubricate or replace
	■ broken jaw coupling	■ replace

Table 1
Corrective Maintenance Table: Rotating Sirens (Part 2 of 5)

Malfunction	Possible Cause	Recommendation
	■ loose setscrew or jaw coupling	■ retighten
	■ improper torque adjustment on drive chain assembly	■ adjust torque to correct slippage
	■ chain slipping off	■ adjust torque spring or replace chain
	■ broken drive chain	■ repair broken links
2. Siren motor doesn't start & siren does not rotate	■ no power to motor controls	■ check fuses and power supply
	■ defective magnetic starter relay	■ replace relay
	■ burned or pitted magnetic starter relay contacts	■ replace relay
	■ loose connections in control panel	■ check & repair
	■ overload is kicked out on starter relay	■ trace overload & correct cause
	■ electric motor windings defective	■ test motor and correct
	■ worn collector rings or brushes	■ replace
	■ dirty or corroded collector rings	■ clean & polish
	■ loose connection on collector ring assembly	■ trace & repair
	■ ice in siren rotor	■ deice with anti-freeze or hot air blower. Do not use flame.

Table 1

Corrective Maintenance Table: Rotating Sirens (Part 3 of 5)

Malfunction	Possible Cause	Recommendation
3. Siren operates with difficulty	■ siren air intake clogged	■ clear obstruction
	■ buildup of foreign material	■ dissemble housing & clean. Air gap should be 0.025 in. or more.
	■ rotation mechanism binding	■ locate problem; free up or replace defective parts
	■ electric motor, rotor, or windings damaged	■ inspect motor armature. Check supply voltage & current during operation.
4. Horn rotates erratically	■ chopper tube bearing binding	■ lubricate bearing
	■ grease on drive bands	■ remove bands, clean & readjust
	■ insufficient drive tension	■ tighten drive band and cross bolt
5. Blower does not operate	■ blower motor starter overload relay tripped	■ reset blower overload relay
	■ open circuit between control cabinet & motor	■ check wiring for continuity
	■ blower motor defective	■ check motor; repair or replace.
	■ blower motor starter control winding defective	■ check coil & replace, if necessary
	■ blower jammed	■ turn blower pulley by hand. Blower should turn easily. Look for cause of jamming if not free.

Table 1
Corrective Maintenance Table: Rotating Sirens (Part 4 of 5)

Malfunction	Possible Cause	Recommendation
6. Blower motor overloaded	■ voltage low	■ install shorter length or heavier gauge wires to siren. Source of power not adequate.
	■ lubricants in blower gear housing too heavy for cold weather.	■ drain and refill with proper lubricants
7. Chopper motor does not operate	■ chopper motor starter overload relay tripped	■ reset relay
	■ open circuit between control cabinet & motor	■ reset relay
	■ chopper rotor jammed	■ check rotor for free rotation. Remove obstruction(s).
	■ collector ring dirty or collector ring brushes worn	■ clean or replace brushes as required
	■ chopper motor defective	■ check motor; repair or replace
8. Chopper motor operates but blower & rotator do not start	■ time delay coil open	■ check coil for continuity. Replace if necessary.
	■ time delay relay inoperative	■ check for proper operation. Replace if necessary.
	■ faulty circuit between time delay relay & motor starters	■ check circuit for continuity. Repair if necessary.

Table 1

Corrective Maintenance Table: Rotating Sirens (Part 5 of 5)

Malfunction	Possible Cause	Recommendation
9. No two-tone modulation	■ tone modulator relay or tone modulator timer faulty	■ check circuit for operation; repair or replace as required.
	■ open circuit between auxiliary control panel solenoid-operated slide valves	■ check circuit for continuity. Repair if necessary.
	■ solenoid-operated slide valve(s) inoperative	■ check slide valves for possible mechanical jamming
		■ solenoid(s) faulty. Check solenoids & replace if necessary.
	■ collector ring dirty or collector ring brushes worn	■ clean or replace brushes as required
	■ solenoid return springs dislodged or broken	■ replace springs

Table 2
Corrective Maintenance Table: Stationary Sirens (Part 1 of 2)

Malfunction	Possible Cause	Recommendation
1. Siren motor inoperative	■ motor starter overload relay tripped	■ reset relay
	■ open circuit between control cabinet & motor	■ check wiring for continuity.
	■ rotor(s) jammed	■ check rotor(s) for free rotation. Remove material causing jamming.
	■ siren motor defective	■ check motor; repair or replace
	■ open thermal protector in motor	■ repair
2. Coding mechanisms inoperative	■ open connection between solenoid and control	■ check wiring for continuity
	■ defective solenoid	■ check solenoid; repair or replace
	■ jammed damper plate	■ check for obstructions. Remove material causing obstructions.
	■ broken spring or crank loose on connecting rod	■ replace spring
	■ alternating timer mal-functioning	■ repair or replace, if necessary

Table 2
Corrective Maintenance Table: Stationary Sirens (Part 2 of 2)

Malfunction	Possible Cause	Recommendation
3. Siren motor does not start	■ no power to motor	■ check fuses
	■ defective magnetic starter relay	■ replace relay
	■ burned or pitted magnetic starter	■ replace relay

Table 3
Corrective Maintenance Table: Electric Sirens

Malfunction	Possible Cause	Recommendation
1. Siren does not operate	■ broken diaphragm	■ replace diaphragm
	■ open circuit between control cabinet & motor	■ check wiring for continuity
	■ no power to motor	■ check fuses
	■ defective magnetic starter relay	■ replace relay

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